

mann covers biology as well. One half of the work is taken up with detailed recommendations for class teaching in branches of natural science, viz. physics, chemistry, mineralogy, geology, astronomy, and biology, then chapters are added on the equipment of laboratories, the preparation and use of text-books, the training of science teachers, the treatment of scientific ideas in the order of their historical development; then some half-dozen appendices give documents taken partly from the regulations of the Kultus Ministerium in Prussia and in other German States, side by side with resolutions adopted by associations of science teachers, in which no doubt Dr. Dannemann is a leading personality.

The adoption of the term "praktisch-heuristisch" is sufficiently significant of the author's position. He does not give the history of the name "heuristic," and only incidentally refers to Prof. Armstrong, but in all his work he is definitely on the side of those who insist that the centre of a course of science teaching shall be at the bench in the laboratory, and that demonstration and discussion in the class-room must be associated with and take their cue from this centre of activity. He has nothing but scorn for the "Kreidephysik" which is still too commonly found in German schools, where the teacher with his chalk and blackboard demonstrates the truths of natural philosophy. It is very interesting to witness, from the pages of this work, how very reluctant German authorities are to adopt these reforms, and no doubt a strenuous advocate of English methods has not always a happy time among his countrymen. Indeed, the case is curiously paralleled by what is happening in England as regards modern language teaching. The "reformers" here look chiefly to Victor and others in Germany for inspiration, and turn to many examples in German schools to show how a foreign language can be acquired. Dr. Dannemann tells his countrymen to look to the practical English teacher and to abandon their reliance on the parrot-like learning of scientific text-books.

Although much of the ground covered by these chapters will be familiar to the English teacher of science, there are portions which are novel, especially in the plans by which the author hopes to give a secondary schoolboy some grasp of the entire field of natural science before leaving school; and the sketch of science teaching from the genetic standpoint is also well worthy of careful perusal.

The chapter on the training of science teachers seems to us the weakest part of the book. It is difficult to see how university men can be kept for a year doing the very elementary work which Dr. Dannemann proposes for them; a man ought to have learned, during his university career in laboratories, to be able to secure himself and his scholars against accidents. But it is a little difficult to realise fully the conditions of German schools in these respects. We are sure from the quality of this and other writings by the author that any "Kandidat" who was sent to learn the business of a science teacher from him would gain a thorough understanding both of principles and practice.

NO. 2001, VOL. 77]

WIRELESS TELEGRAPHY AND TELEPHONY.

Jahrbuch der drahtlosen Telegraphie und Telephonie.

Band i., Heft i. Edited by Dr. G. Eichorn. (Leipzig: S. Hirzel, 1907.) Preis für den Band, 20 marks. *Wireless Telephony in Theory and Practice.* By E. Ruhmer. Translated by J. Erskine-Murray. Pp. xv + 224. (London: Crosby Lockwood and Son, 1908.) Price 10s. 6d. net.

THE publication of the first number of a German year-book of wireless telegraphy and telephony affords an indication of the growing importance of this branch of electrotechnics. The volume before us is more of the character of an ordinary scientific magazine than of a year-book, since there is not really much attempt to summarise the progress during the past year, which, we take it, is peculiarly the function of a year-book. This objection apart, the publication deserves praise on account of the merit of the articles which it contains. Of these the most important are one by Prof. F. Braun on directed wireless telegraphy, one by Dr. Simon on the production of undamped waves, and one by Prof. Fleming on some of the most recent developments.

Dr. Simon's article will be read with special interest at the present time on account of the experimental work which is being carried on in all countries for the development of wireless telephony. In addition to these and some minor papers, there is a valuable bibliography.

The development of wireless telegraphy during the twenty years which have passed since the discoveries of Hertz has presented some peculiar features. Grown out of a discovery which, theoretically regarded, was of a sensational nature, wireless telegraphy has always seemed to have a tendency to sensational rather than solid progress. Except in so far as its military and naval value is concerned, the world at large cannot be said to have derived as yet any very great advantage from its development, and we doubt whether financial success, the touchstone of utility, has as yet rewarded any of the companies which have been pioneering the various systems. On the other hand, sensational performances, in which the hearts of all wireless workers appear to rejoice, have been frequent. The Marconi Company's first attempts to establish Transatlantic communication, the signal failure of their first commercial system of Transatlantic wireless telegraphy, and the apparent failure, so far, of their more recent attempt, will be fresh in the minds of all. As we have before pointed out in these columns, it would appear that the enormous efforts and expenditure which have been lavished on the development of long-distance signalling might have been much more usefully spent on the development of less ambitious but more solidly useful schemes.

More recently the attention to the production of undamped oscillations on the principle of the Duddell musical arc (as in the Poulsen system) has stimulated research on the wireless transmission of speech, and considerable success has attended the experiments. In Germany successful transmission across ten miles of land (right across Berlin) has been attained, and in America, in addition to the equipment of the torpedo-

boats of the Pacific fleet with wireless telephone apparatus on the De Forest system, one may note that stations have been working successfully on the Fessenden system over a distance of 200 miles (more than half over land).

A very full descriptive account of the experimental work which has been carried out on wireless telephony is to be found in Prof. Ruhmer's book. The volume is not confined to telephony by means of Hertzian waves, the particular branch which now occupies the most important and the most promising position. In fact, nearly one-third of the volume is devoted to wireless telephony by means of light, in which a speaking arc is utilised as transmitter and a sensitive selenium cell as receiver. This method, which owes much of its development to Prof. Ruhmer, has attained considerable success, fair distances having been bridged over both water and land. The volume is profusely illustrated by both photographs and drawings, and should prove a useful reference work for those directly or indirectly interested in the subject.

There can be no question that the successful solution of the problem of wireless telephony will mark a very considerable advance in the art of wireless communication. It is true that the difficulties of interference and lack of secrecy have to be met with telephony as with telegraphy, but there are, at any rate, the same compensating advantages which are to be found in ordinary telephony over telegraphy. It is to be remarked also that efforts to establish long-distance wireless telephony, across the Atlantic, for example, are not open to the same objection as applies to the attempts to establish Transatlantic wireless telegraphy, since in this case the field is not already occupied by cables performing the same service more efficiently.

M. S.

THE TABERNACLE AND THE TEMPLE.

The Tabernacle: its History and Structure. By the Rev. W. Shaw Caldecott. Pp. xxii+236. Second Edition. (London: Religious Tract Society, 1906.) Price 5s.

Solomon's Temple: its History and Structure. By the Rev. W. Shaw Caldecott. Pp. xiii+358. (London: Religious Tract Society, 1907.) Price 6s.

THE interest which Anglo-American Protestantism has always taken in the præ-Christian Biblical books, and in the land of Canaan, in which the events of ancient Israelitish history, traditionally described in them, took place, has again been exemplified in yet another addition to the long list of pious speculations as to the appearance of the Israelitish Tabernacle and of the Temple of Yahweh at Jerusalem. Mr. Caldecott is an enthusiast, like his forerunners, for none but an enthusiast would be bold enough to explain the meaning of doubtful cuneiform signs to cuneiform scholars, or to invite prefaces from a master of cuneiform science, Prof. Sayce, in which the ingenuous author of the book is publicly told that, however nice and interesting his discussion of the Tabernacle and the Temple may be, his cuneiform cannot be accepted.

Mr. Caldecott's *naïveté* in thus rushing in where those who know the root of the matter fear to tread, necessarily vitiates the credibility of the remainder of his speculations in the mind of the scientific reader.

Nevertheless, Mr. Caldecott is more critical than most of his predecessors, which is an encouraging symptom. His sketch of the history of the Jewish Kingdom is very readable, and, though conservative, contains little at which a moderate "higher critic" might cavil, though no doubt a Jerahmeelite might consider it a sufficiently benighted performance. The views of the Jerahmeelites do not, however, any longer count among scientific archæologists in England, although the Germans, swayed by their quaint national delusion that no really valuable work in archæology or Biblical criticism can possibly be done by anybody but Germans (or non-Germans taught to perform the scientific *Parademarsch* by German drill-instructors), no doubt still believe in the wild "North-Arabian" theories of Winckler in which Cheyne found support for the Jerahmeel-cryptogram.

We are glad that Mr. Caldecott has not adopted the legend of the "second Musri," and that for him Esarhaddon's "Sib'e, the *Tartannu* of Pir'u King of Muşri," is, as he is to every sane critic, "So (Seve) the general of Pharaoh King of Egypt," i.e. the King Shabak understood as an officer of the Ethiopian king, probably Kashta, who ruled in Upper Egypt. But we think that Mr. Caldecott, in his note on Sib'e ("Temple," p. 139), should have referred to Winckler's Muşri-theory, and given his reasons for not accepting it. This would have been the scientific way of doing things. As it is, he lays himself open to the suspicion of not having known anything about an important theory, very germane to his subject, which archæologists and "higher critics" have been debating for years. And this possibility again makes one doubt the real value of this sort of work, despite the kind words of encouragement bestowed by Prof. Sayce upon the present author in respect of everything but his cuneiform. Whether, as he thinks, Mr. Caldecott's speculations will excite new interest in excavations in Palestine is doubtful; unluckily, these excavations have not always produced such "pat" results as seem generally to be expected from them. Those of the Austrians at Taanach seem to be the most interesting hitherto.

The identification of the modern Rāmet el-Khaḫīl with the ancient Ramah near Jerusalem, where the Tabernacle was set up, is, as Mr. Caldecott points out, due to the late Edward Robinson, who proposed it in 1838. The latter calls it quite correctly "er-Rameh"; Mr. Caldecott should be careful not to go on calling it, as he continually does, "Ramet" when he does not add the suffix "el-Khaḫīl"; the name of the place is Rameh or Rāma (usually with the definite article prefixed), which becomes "Rāmet" in the construct state, as "Ramet el-Khaḫīl."

In conclusion, we would advise our author, before he publishes new editions of his books, to consult the articles "Tabernacle" and "Temple," by Dr. Benzinger, in the "Encyclopædia Biblica"; they may give him some novel information on certain points.